DEPARTMENT OF INFORMATION TECHNOLOGY
FAIRFAX COUNTY, VIRGINIA

In the Matter of	)	
	)	
Improving Public Safety Communications	)	
in the 800 MHz Band	)	WT Docket 02-55
	)	
and	)	
	)	
Consolidating the 900 MHz Industrial/Land	)	
Transportation and Business Pool Channels	)	

COMMENTS FROM THE

DEPARTMENT OF INFORMATION TECHNOLOGY

FAIRFAX COUNTY, VIRGINIA

April 30, 2002

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I INTRODUCTION

1. Fairfax County, Virginia (Fairfax County) is required to provide Law Enforcement and Fire & Rescue Services to the County's citizens and visitors. Fairfax County participates in many agreements with surrounding jurisdictions to provide and receive Law Enforcement and Fire & Rescue mutual aid support. These agreements exist today as a result of the poor interjurisdictional communications that occurred during Air Florida Flight 90 rescue operations in 1982. Because of these mutual aid agreements Fairfax Law Enforcement, Fire & Rescue and the Fairfax Urban Search and Rescue Unit were among the first responders to the Pentagon on September 11, 2001. The Northern Virginia Public Safety Agencies have spent many years assembling a comprehensive regional 800 MHz mutual aid radio communications plan. This plan worked extremely well for the Pentagon incident on September 11, 2001. Fairfax County is a major stakeholder in the outcome of any rulemaking that affects public safety communications in the 800 MHz band.

2. Jurisdictions throughout the Northern Virginia and Metropolitan Washington regions have made a major commitment to 800 MHz as the common band of choice for public safety communications. Many jurisdictions, including Fairfax County, have recently implemented, or are in the process of implementing, new analog or digital 800 MHz trunked public safety radio systems. Other jurisdictions are in the process of upgrading their existing 800 MHz public safety trunked radio systems. A common frequency band and compatible technology are driving

the regional migration to the 800 MHz band. All of this is being done to enhance inter- and intra-jurisdictional public safety communications. Fairfax County notes that similar efforts are under way or have been completed in other major metropolitan areas in the United States.

3. Fairfax County's public safety radio system is one of the public safety systems that is experiencing system coverage degradation from NEXTEL sites in the County. Fairfax County notes that its 800 MHz radio systems are experiencing interference in several known locations within Fairfax County. Interference may also be occurring in other locations not yet known. Thus far, the severity of the interference ranges from slight to severe, depending on the specific case of interference, the location of the radio system user in an interference zone, and the trunking channel in use at the time. Consequently, the level of interference in a given interference zone can vary from none to severe, depending on the location of the user and the trunking channel that they are currently monitoring.

II **EXECUTIVE SUMMARY**

4. The Commission has issued a Notice of Proposed Rulemaking in response to numerous reports of CMRS interference to 800 MHz public safety licensees, and an ex-parte proposal submitted by NEXTEL, Promoting Public Safety Communications. NEXTEL proposes to reorganize the current 800 MHz land mobile radio (LMR) bands. In the proposed reorganization, incumbent 800 MHz licensees currently operating in the 861-866 MHz "Upper 200" band and the 866-869 MHz "NPSPAC" band would relocate to frequencies in the current "General Category" and "Interleaved" sections of the 850-861 MHz band. NEXTEL facilities currently operating in the 850-866 MHz range would relocate to the newly created "Digital SMR" 861-869 MHz band. Public safety licensees operating in the 850-866 MHz frequency range would receive primary status. Existing Business and Industrial/Land Transportation licensees operating in the newly reorganized 850-861 MHz band would continue their operations on existing facilities and frequencies under secondary status. The Commission has also received a similar relocation/reorganization proposal from the National Association of Manufacturers (NAM).

5. The fact that NEXTEL has suggested segregation of their operations from other Land Mobile Radio Services indicates Nextel's recognition that *Nextel's system architecture and transmission modes are incompatible with the pre-existing LMR technologies and systems in the 800 MHz band*.

6. Though Fairfax County acknowledges that some form of band reorganization may be necessary to fully resolve the 800 MHz CMRS to LMRS interference issue, the County is generally opposed to any reorganization or restructuring of the 800 MHz land mobile radio bands. Realistically, any relocation of the scope proposed by Nextel and NAM will take a long time to implement, and will have extraordinarily high costs associated with the effort required for frequency coordination, system redesign, system reconfiguration, new equipment, relicensing, additional towers and other infrastructure. Though Nextel proposes to partially fund the relocation and reorganization with $500M of its own funds, it is not clear where the balance of the necessary funds will come from, nor is it clear exactly how much a relocation and reorganization effort of this scope and magnitude will ultimately cost. It is clear to Fairfax County that the costs associated with correcting this interference issue should be not be borne

by taxpayers in Fairfax County, or in any other political jurisdiction.

7. It is Fairfax County's position that Nextel must correct interference caused by Nextel stations to public safety communications and other LMRS licensees operating in the 800 MHz LMRS bands and bears all associated costs. If, on the other hand, Nextel is indicating by its proposal that it cannot prevent or correct the interference, then it only makes sense that Nextel's operations be moved out of the 800 MHz band and into equivalent spectrum elsewhere, e.g., to the 700 MHz band, and all associated costs be borne by Nextel. The spectrum vacated by Nextel should be shared equitably between all incumbent services in the 800 MHz bands.

III. **BACKGROUND**

8. In the early 1980s the Northern Virginia public safety community saw the need for better mutual aid communications. Early mutual aid communications systems consisted of radio channel patches that connected systems together in crude patching arrangements. These patching arrangements relied on mobile and portable radios communicating with base stations on an agency's home system that may be many miles from the mutual aid incident. As a result, though mutual aid communications were dramatically improved over that of previous years, serious deficiencies remained in the ability of the Northern Virginia public safety agency's ability to communicate with each other during mutual aid incidents.

9. As more and more Northern Virginia public safety agencies transitioned to trunked radio systems operating in the 800 MHz band, a new mutual aid communications plan was formulated. This plan uses the simple, yet highly effective approach of configuring end user mobile and portable radios with talkgroups or channels used by neighboring jurisdictions. In essence, a jurisdiction providing mutual aid assistance to a neighboring jurisdiction essentially becomes a part of that jurisdiction's radio system for the duration of the mutual aid event. This plan has taken many years of hard work to evolve to what exists today. In Northern Virginia, this plan is relied upon every day to provide critical public safety services to the citizens in the region. The plan was also responsible for the successful multi-jurisdiction response to the Pentagon attack. It is absolutely essential that these public safety mutual aid communications plans stay intact and that interference to public safety systems is kept to an acceptable minimum.

10. We believe that the interference to public safety radio communications by Nextel stations operating in the 800 MHz LMRS bands is a direct result of licensing an incompatible cellular design on channels that interleave with channels of existing services operating in analog and digital FM conventional and trunking modes. Public Safety communications are especially vulnerable because of their heavy reliance on portable handheld radios operating at low signal strength. As Nextel continues to build out their system, they will increase the geographical density of their base stations, and in many cases, lower antenna heights above ground level, increasing the incidence and likelihood of interference to public safety and other vital communications.

IV. **DISCUSSION**

11. Fairfax County agrees that action is needed to protect public safety communications channels from Nextel and other interference sources. We also agree that realigning spectrum

may be the only possible way to provide the frequency separation required to prevent the non-compatible system interference to public safety. The occupants of the 806 and 821 bands have coexisted for many years. If the Nextel system architecture and mode of operation is truly incompatible with that of the incumbents, it is fitting that Nextel should move their operations to another band. This burden should not rest on the incumbents. Nextel should take full responsibility for the interference their operation creates to public safety licensees in the 800 MHz band, and correct interference issues that their stations create.

12. Nextel's proposal appears to assume that public safety radios and fixed end equipment would be capable of operating on the newly assigned channels after simple reprogramming or retuning. This is not necessarily the case. Some relocation scenarios would necessitate total replacement of the public safety fixed-end equipment and subscriber units. System replacement costs would range several million to over one hundred million dollars per system. In their proposal Nextel has offered to contribute $500 million toward covering these costs. Although no detailed accounting has been made to our knowledge, Nextel's figure has been estimated to be $1/10^{th}$ to $1/20^{th}$ of the total expected cost that would be incurred by all affected public safety entities nationwide. No provision has been made to compensate non-public safety incumbents (e.g., Business, Industrial and Land Transportation licensees) required to move in the affected frequency bands.

13. Fairfax County has analyzed the potential financial and operational impact to the County should the Nextel 800 MHz or other similar band restructuring proposal be adopted. Assuming a reprogramming and retuning-only scenario, the County estimates a cost of approximately $1M, and considerable operational impact to coordinate the radio reprogramming internally and with the County's many mutual aid partners. If more substantial network changes are required, the cost could range from $15M to $30M or more. Estimating these costs is difficult, as many factors are not known at this time. For example, what restrictions will the Commission impose on public safety licensees in the newly created public safety band, with regard to restricting emissions outside of the County's boundaries? If restrictions similar to those that apply in the current NPSPAC 821/866 MHz band are adopted in the proposed public safety band, significant system design changes will be necessary to make the County's existing 806/850 MHz system compliant.

14. Based on its own experiences to date, working directly with Nextel, and the experiences of other public safety agencies, for example, in the Portland, Oregon area, Fairfax County believes that much of the current interference can be corrected using a variety of proven interference mitigation methods. Fairfax County notes that certain characteristics of the Nextel system design and architecture, not mentioned in the Nextel proposal or the NPRM, actually increase the likelihood that Nextel stations will cause interference to other 800 MHz licensees. For example, at a Nextel site, all transmitters are actively transmitting all of the time, regardless of whether voice or data traffic is present. In addition, Nextel stations appear to operate with significantly more transmitter power than needed to effectively communicate with the Nextel subscriber radios. It is also apparent that Nextel stations operate multiple transmitters at each site, to obtain the capacity necessary to provide service to their subscribers. There has been some discussion that at certain Nextel sites, Nextel is using a "hybrid combiner" to combine these multiple transmitters into a single antenna. This type of combiner does not provide any attenuation of transmitter sideband noise and spurious products, and can cause an elevated noise floor in the vicinity of the Nextel station. Depending on

the amount of RF energy present from the public safety system, this elevated noise floor can cause interference. Other types of transmitter combiners are available that can provide significant attenuation of sideband noise and spurious products.

15. Nextel must correct the deficiencies in their system to eliminate interference to the pre-existing LMRS in the 800 MHz band and bear all associated costs. If on the other hand, as Nextel is indicating by it's proposal that it cannot prevent or correct the interference, then it only makes sense that Nextel's operations be moved out of the 800 MHz band and into equivalent spectrum elsewhere, e.g., to

16. Though Nextel appears to be operating in compliance with FCC technical specifications, it is apparent to Fairfax County that much can be done on the part of Nextel to decrease the likelihood that their facilities will interfere with other 800 MHz licensees. Fairfax County believes that good engineering practice, combined with tighter technical specifications for CMRS operators and continued cooperation with other 800 MHz licensees may in fact be all that is needed to ensure interference free public safety communications, and encourages the Commission to carefully consider this as an alternative to the massive effort and upheaval required to reorganize the entire 800 MHz LMRS band and relocate incumbent users.

17. Both the "Best Practices Guide" and the Commission's NPRM recognize that the interference to public safety falls into four major categories; intermodulation, receiver overload, transmitter sideband noise, and the effects due to the transition from analog to digital modulation. Fairfax County concurs with this assessment of the current interference environment. Again, Fairfax County believes that interference that does occur can be effectively mitigated using good engineering practice and the techniques described in the "Best Practices Guide". It should be noted that, at least in the case of Fairfax County, far more cases exist where interference is not present in the vicinity of Nextel sites than cases where interference does exist.

18. Though Fairfax County acknowledges that the Commission has the authority to restructure the 800 MHz band as needed to best serve the public interest, we believe that no real precedent exists for a band restructuring and reorganization of the scopes proposed by Nextel and NAM/MRFAC. This is true particularly in cases where a licensee is creating harmful interference to the operation of another licensee. The County fully understands the history and chain of events that created this interference problem. However, history and events alone do not dismiss Nextel's responsibility to correct interference that it creates, even if the Commission or Nextel did not foresee the interference when Nextel's network was in its infancy.

19. Though a band reorganization and relocation will segregate Nextel into a separate block of spectrum, there is no guarantee that all interference to public safety communications will be resolved by this drastic and complicated measure. Indeed, interference resolution is a complex matter, especially with today's heavily populated tower and rooftop radio sites. Fairfax County acknowledges that Nextel's proposal includes a proposal for a "guard band" between the proposed public safety and Nextel spectrum. Fairfax County notes, with interest, that the spectrum for this "guard band" is taken from the range of frequencies proposed for use by public safety in Nextel's proposal. Be that as it may, it is not likely that a "guard band" of any size will be sufficient to fully guarantee that interference will be prevented in every case.

20. the 700 MHz band, and all associated costs be borne by Nextel. The spectrum vacated by Nextel should be shared equitably between all incumbent services in the 800 MHz bands.

21. Public safety licensees and equipment manufacturers also have some responsibility in this matter. Clearly, there are changes that can be made in receiver and system designs that can make 800 MHz public safety radio systems less susceptible to interference from CMRS stations. For example, public safety receiver design improvements may be possible to provide additional protection from strong signal overload, receiver desensitization or intermodulation. Many 800 MHz public safety radio system designs provide additional design margin to all operations using portable radios. In many cases, this margin can also help overcome interference from CMRS providers.

V. CONCLUSION

22. Significant progress towards establishing seamless mutual aid communications has been made in the Metropolitan Washington, DC and Northern Virginia regions. Much of this capability is a result of common public safety radio network technologies operating in the 800 MHz band.

23. Both the 800 MHZ CMRS interference and the band restructuring proposals intended to correct it threaten the public safety and mutual aid communications progress that has been made in Fairfax County and the rest of the Northern Virginia and Metropolitan Washington regions.

24. Restructuring the 800 MHz band to correct the interference is a drastic measure and should be taken as a last resort. Public safety licensees are not responsible for creating the current 800 MHz interference environment. If restructuring is ultimately found to be the only way with which the interference can be sufficiently mitigated, public safety licensees should not have to bear the costs and burdens of a band restructuring. It is possible that suitable spectrum for CMRS technologies can be found in the 700 MHz band.

25. Based on its own experiences to date, and anecdotal reports of the experiences of other 800 MHz public safety licensees, Fairfax County believes that many cases of 800 MHz CMRS interference to public safety licensees can be corrected on a case by case basis by using good engineering practice and proven interference mitigation techniques.

26. It is clear that the 800 MHz band landscape has changed significantly. Fairfax County believes that mission critical public safety interference cases require immediate relief. The Nextel proposal and other similar band restructuring plans will take a long time to implement with no guarantee of complete success. Nextel has a responsibility to correct cases of interference to public safety communications caused by Nextel stations. Fairfax County believes that this relief should be immediate and should be enforced by the Commission in cases where Nextel is unwilling or otherwise unable to correct the interference. As a long term solution, Fairfax County recommends that the Commission consider modifying the technical specifications and type acceptance criteria for 800 MHz licenses and equipment to promote improved receiver designs that are more immune to

strong signal overload, and CMRS stations that are less likely to generate interference to public safety communications.

27. It is Fairfax County's position that Nextel must bear the burden and all costs associated with correcting the interference problem resulting from their operations in the 800 MHz band. In the event that segregation of the services is the only viable option, then Nextel should leave the 800 MHz band and move its operations to separate spectrum, allocated in the same way that the cellular mobile telephone service has separate blocks of spectrum. The spectrum vacated by Nextel should be shared equitably between all incumbent services in the 800 MHz bands. Incumbent public safety licensees should not be forced to relocate to new spectrum, or bear any of the cost, direct or indirect, of relocating offending systems.